AF 2635

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: RONALD BJORKLUND, RAJ BRIDGELALL, WILLIAM DEROUCHEY, CHARLES FUREDY, RICHARD WATSON	Group Art Unit: 2635
	Examiner: C. I. YANG
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Filed: JANUARY 14, 2000	
For: MULTI-TIER WIRELESS COMMUNICATIONS ARCHITECTURE, APPLICATIONS AND METHODS	CUSTOMER NO.: 23720

APPEAL BRIEF

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8	
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Sir:

On February 24, 2005, Appellants filed a Notice of Appeal in response to a Final Office Action dated October 26, 2004, issued in connection with the above-identified application. In support of their appeal, Appellants hereby submit this Appeal Brief to the Board of Patent Appeals and Interferences. Because this Appeal Brief is being filed within two months of the Notice of Appeal, it is believed to be timely filed.

The fee for filing this Appeal Brief is **$500.00**. **A check for this amount is enclosed herewith.** In the event the monies in that account are insufficient, should any fees under 37

C.F.R. §§ 1.16 to 1.21 (or any other section) be required for any reason, the Commissioner is authorized to withdraw funds from Williams, Morgan & Amerson, P.C. Deposit Account No. 50-0786/6000.000300/0838.

I. REAL PARTY IN INTEREST

The present application is owned by Symbol Technologies, Inc.

II. RELATED APPEALS AND INTERFERENCES

Appellants are not aware of any related appeals and/or interferences that might affect the outcome of this proceeding.

III. STATUS OF THE CLAIMS

Claims 34-58 are pending in the present application. The Examiner has allowed claims 35-36, and has indicated that claims 49-50 and 56-57 are allowable if rewritten in independent form including all of the limitations of the intervening claims. Claims 34, 37-43, 45-48, 51-55, and 58 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,790,536 (Mahany) in view of U.S. Patent No. 6,275,166 (del Castillo). Claim 44 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,790,536 (Mahany) in view of U.S. Patent No. 6,275,166 (del Castillo) and further in view of U.S. Patent No. 5,673,252 (Johnson). The rejected claims 34, 37-48, 51-55, and 58 are the subject of this appeal. For convenience, however, all of the claims (including those allowed and objected to) are attached as Appendix A.

IV. STATUS OF AMENDMENTS

No amendments have been made since the Final Office Action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claims and one or more of the described embodiments of the present invention are generally directed to a multi-tier communications system in which a host 112 can control a remote unit (*e.g.*, 166, 174) through a first-tier base station (*e.g.*, 122) and a plurality of second-tier base stations (*e.g.*, 142, 152). Patent Application, page 6, lines 1-6. The distinction between the first-tier and second-tier base stations is discussed in the patent application. For example, the patent application discloses that while the first-tier base stations have a longer transmission range compared to the second-tier base stations, the second-tier base stations consume lower power. *See* Patent Application, page 6, lines 20-22. As another example, as described in the patent application and specified in some of the independent claims, the first-tier base station operates in accordance with a first communications protocol, while the second-tier base stations communicate with each other using a protocol different from the first communications protocol. *Id.* at page 6, lines 7-15; page 6, line 20 – page 7, line 4.

As explained more fully in the patent application, the first-tier base station 122 and a plurality of second-tier base stations (which typically consume lower power) can be advantageously coupled to extend the range of communications over which the host 112 can control the remote device(s) (*e.g.*, 166, 174). *Id.* at page 9, lines 13-18. For example, Figure 4 of

the patent application illustrates that a plurality of second-tier base stations 462, 470 may, in one embodiment, be "serially" coupled to control the door locks 444 on a given floor of a hotel. *Id.* at page 11, lines 6-9. In Figure 4, the first-tier base station 450 communicates with the first second-tier base station 460, which can then wirelessly communicate with another second-tier base station 470 to control the door locks on the distant end of the floor. *Id.* at page 11, lines 20 – page 12, line 19. In this manner, the door locks can be controlled by a host over any desirable amount of distance though a plurality of linked, low-power consuming second-tier base stations 462, 470. Similarly, this multi-tier arrangement may be deployed to control a variety of other remote units described in the patent application, such as thermostats or security cameras. *Id.* at page 13, lines 5-13.

The pending claims are generally directed to the above-described multi-tier communications system in which a host can control one or more types of remote units through a first-tier base station that is coupled to a first second-tier base station that is further coupled to a second second-tier base station.

Of course, the present invention should not be considered as limited to the specifically disclosed embodiments discussed immediately above.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether claims 34, 37-43, 45-48, 51-55 and 58 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,790,536 ***(Mahany et al.)*** in view of U.S. Patent No. 6,275,166 (***del Castillo et al.***); and

VII. ARGUMENT

1. Legal Standards

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991); M.P.E.P. § 2142. Moreover, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (CCPA 1974). If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); M.P.E.P. § 2143.03.

With respect to alleged obviousness, there must be something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561 (Fed. Cir. 1986). In fact, the absence of a suggestion to

combine is dispositive in an obviousness determination. *Gambro Lundia AB v. Baxter Health-care Corp.*, 110 F.3d 1573 (Fed. Cir. 1997). The mere fact that the prior art can be combined or modified does not make the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990); M.P.E.P. § 2143.01. The consistent criterion for determining obviousness is whether the prior art would have suggested to one of ordinary skill in the art that the process should be carried out and would have a reasonable likelihood of success, viewed in the light of the prior art. Both the suggestion and the expectation of success must be founded in the prior art, not in the Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991; *In re O'Farrell*, 853 F.2d 894 (Fed. Cir. 1988); M.P.E.P. § 2142. A recent Federal Circuit case emphasizes that, in an obviousness situation, the prior art must disclose each and every element of the claimed invention, and that any motivation to combine or modify the prior art must be based upon a suggestion in the prior art. *In re Lee*, 61 U.S.P.Q.2d 143 (Fed. Cir. 2002). Conclusory statements regarding common knowledge and common sense are insufficient to support a finding of obviousness. *Id.* at 1434-35.

It is by now well established that teaching away by the prior art constitutes *prima facie* evidence that the claimed invention is not obvious. *See, inter alia, In re Fine,* 5 U.S.P.Q.2d (BNA) 1596, 1599 (Fed. Cir. 1988); *In re Nielson*, 2 U.S.P.Q.2d (BNA) 1525, 1528 (Fed. Cir. 1987); *In re Hedges*, 228 U.S.P.Q. (BNA) 685, 687 (Fed. Cir. 1986).

A. <u>Claims 34, 37-48, 51-55 and 58 are patentable over the cited references</u>

Claim 34, which is representative of the other claims, is discussed first. Claim 34 is directed to a multi-tier system for digital radio communication. The system includes a processor-based host adapted to control a remote unit. The system includes a first-tier base station communicatively coupled to the host, wherein the first-tier base station operates in accordance with a first communications protocol. The system further includes a first second-tier base station communicatively coupled to the first-tier base station, wherein the first second-tier base station and the first-tier base station communicate using the first communications protocol. Claim 34 specifies that the system includes a second second-tier base station wirelessly coupled to the first second-tier base station, wherein the second second-tier base station is intermediate the first second-tier base station and the remote unit, and wherein the first second-tier base station is capable of communicating with the second second-tier base station without an intervening first-tier base station using a different communications protocol from the first communications protocol. Claim 34 further specifies that the host is adapted to control the remote unit through the first-tier base station, the first second-tier base station, and the second second-tier base station.

The Examiner admits that ***Mahany*** at least does not the last claimed feature of the host controlling the remote unit through the first-tier base station, the first second-tier base station, and the second second-tier base station. The Examiner, however, argues that this feature is taught by ***del Castillo***. *See* Final Office Action, page 6. The Applicants respectfully disagree, for reasons stated below.

1. THE CITED REFERENCES LACK THE REQUISITE SUGGESTION OR MOTIVATION TO COMBINE

Neither ***del Castillo*** nor ***Mahany*** includes the requisite suggestion or motivation to the combine the references in the manner suggested by the Examiner. In fact, if anything, the two references teach away from the claimed invention, as discussed below.

The first reference, ***del Castillo***, is directed to a system for controlling appliances, such as heating, air conditioning, and security in a building (*e.g.*, a hotel or a shopping mall). ***del Castillo***, col. 1, lines 5-10; col. 4, lines 4-7. In particular, as shown in Figure 2, ***del Castillo*** teaches sequentially connecting a plurality of short-range appliance management stations (AMSs) 12 (which the Examiner asserts correspond to the first- and second-tier base stations), and then using a control station 14 to control appliances such as temperature sensor, motion detection, card reader (collectively labeled as element 24 in Figure 1) via the AMSs 12. *Id.* at col. 4, lines 1-61. The reference ***del Castillo*** teaches that each AMS 12 typically interfaces with an appliance 24. *Id.* at col. 6, lines 62-66. However, in some instances, according to ***del Castillo***, an AMS 12 may not have an appliance associated with it, in which case the AMS 12 serves as a relay unit (shown as element 20' in Figure 2). *Id.* at col. 6, line 66 – col. 7, line 9. The reference ***del Castillo*** illustrates an exemplary path 44 in Figure 2 over which an appliance may be controlled. For instance, the control station 14 controls an appliance over the path 44 through two AMSs 12, then a relay unit 20', and finally through the final AMS 12. *Id.* at col. 7, lines 9-13. By sequentially connecting the AMSs 12 in the manner shown, ***del Castilloi*** teaches that the control station 14 can control various appliances 24 connected to the AMSs 12.

Mahany is directed to a communications system for providing intelligent data, program, and processing migration. *See* ***Mahany***, col. 2, lines 21-29. The communications system of ***Mahany*** includes two different types of local area networks (LANs) – a premises LAN and a spontaneous LAN. *Id.* at col. 8, lines 61-65; col. 9, lines 32-43. The premises LAN is designed to provide a communication flow within a building premises (hence the term "premises LAN") using a wired backbone cable. *Id.* The premises LAN typically connects base stations and other devices, such as servers. *Id.* at col. 9, lines 4-16. In some circumstances, ***Mahany*** teaches that some devices (such as roaming portable peripheral devices) are not conducive to being coupled to the backbone of the premises LAN. ***Mahany*** describes that instead of relying on the premises LAN for communications, these roaming devices may form alternative LANs spontaneously among themselves in order to communicate. *Id.* at col. 9, lines 32-43. ***Mahany*** clarifies that a spontaneous LAN is fundamentally different from a premise LAN in that spontaneous LAN operation terminates after a task (*e.g.*, printing to peripheral device) has been completed, or if the participants of the spontaneous LAN move out of range of each other. *Id.* at col. 9, lines 29-43. Thus, as the name implies, a spontaneous LAN is ephemeral by nature in that such a connection is routinely created and terminated in time by a roaming peripheral device on an as-needed basis.

Figure 28A of Mahany, which is one of the figures relied upon by the Examiner to reject the claims, is helpful in understanding the operation of a premise LAN and a spontaneous LAN. Figure 28A describes a typical hierarchical communication system of ***Mahany*** in which various devices coupled by the premises LAN and spontaneous LAN (also called "peripheral LAN") are shown. Figure 28A depicts a hierarchical system that consists of a premises LAN covering a warehouse building or a group of buildings. *Id.* at col. 43, lines 59-62. Specifically, the

premises LAN shown includes a hard-wired backbone LAN 3019 and access points 3015 and 3017, which include a large transmitter to provide coverage over the entire warehouse building. *Id.* at col. 43, lines 62-64; col. 44, lines 5-7. The system of Figure 28A includes a host computer 3011 that is directly attached to the backbone LAN 3019. *Id.* at col. 43, lines 64-67.

Figure 28A also includes a roaming computing device, a computer terminal 3007, and a code reader 3009 that a worker may use to collect data, such as identifying numbers or codes on warehoused goods. *Id.* at col. 43, lines 22-25. As the numbers and codes are collected, they are forwarded through the network to the host computer 3011 for storage. *Id.* at col. 43, lines 25-27.

Mahany teaches that some roaming computing devices in Figure 28A do not require a link to the access points 3015 and 3017 to the backbone LAN 3019; rather, with such devices, the communication exchange is generally localized to a small area. *Id.* at col. 44, lines 23-29. Consequently, such roaming devices that participate in localized, shorter range communications form spontaneous LANs. *Id.* at col. 44, lines 29-31. For example, ***Mahany*** teaches that the code scanner 3009 may establish a spontaneous (or peripheral) LAN with terminal 3007 to transmit the information read from the boxes. *Id.* at col. 44, lines 35-38. In turn, the terminal 3007 may desire to print information on a printer 3013, in which case the terminal 3007 may establish a spontaneous LAN with a printer 3013. *Id.* at col. 44, lines 38-51. However, because terminal 3007 is a roaming device, ***Mahany*** discloses that the terminal 3007 establishes the spontaneous LAN with the printer 3013 only when it enters the vicinity of the printer. *Id.* This LAN connection is terminated either when the printing task is complete or when the terminal 3007

moves out of range. *Id.* at col. 9, lines 29-43. Similarly, code reader 3009 must be within the transmission range to communicate with the terminal 3007.

As noted, the Examiner relies on a combination of the references ***Mahany*** and ***del Castillo*** to reject the pending claims for obviousness. However, to establish a *prima facie* case of obviousness, the Federal Circuit has noted that there must be some suggestion or motivation to modify the reference or to combine reference teachings. Moreover, suggestion or motivation to combine two or more references cannot be supplied through abstraction but must be grounded in practical considerations flowing from "positive, concrete evidence of record which justifies a combination of primary and secondary references." *In re Regal*, 188 U.S.P.Q. (BNA)136, 139 (C.C.P.A. 1975) (n. 6). A simple assertion that such a combination would be obvious to one of ordinary skill in the art cannot substitute for the type of evidence required by *Regal*. *See Fine*, 5 U.S.P.Q.2d (BNA) at 1599-1600. Here, the Examiner has failed in her proof.

In rejecting claim 1, the Examiner asserts that access point 3021 of Figure 28A of ***Mahany*** corresponds to the first second-tier base station and that computer terminal 3007 and storage terminal 3031 (Figure 28B) correspond to the second second-tier base stations. *See* Final Office Action, pages 5-6. The Examiner argues that the computer terminal 3007 and storage terminal 3031 qualify as "second tier base stations" because they use a narrowband, single frequency protocol that has a shorter transmission range relative to the access points 3015, 3017. *Id.* The Examiner also asserts that the claimed remote unit corresponds to code reader 3009/printer 3013. *Id.* The Examiner admits that ***Mahany*** at least does not the last feature of claim 1 that calls for a host that is adapted to control the remote unit through the first-tier base

station, the first second-tier base station, and the second second-tier base station. The Examiner, however, argues that this feature is taught by ***del Castillo***. *See* Final Office Action, page 6. The Applicants respectfully disagree.

As explained earlier, ***Mahany*** teaches two types of LANs, a premises LAN and a spontaneous (or peripheral) LAN. According to the Examiner, the claimed "first-tier base station" corresponds to the access points 3015, 3017 of the premise LAN, and the "second second-tier base stations" correspond to terminals 3007, 3031 that transmit at a lower power than the access points 3015, 3017. Further, the Examiner asserts that the terminal 3007 qualifies as a "second second-tier base station" because Mahany teaches that the bar code reader 3009 (which corresponds to the "remote unit," according to the Examiner) communicates with the terminal 3007. *Id.*

Mahany teaches that code reader 3009 (the "remote unit," according to the Examiner) establishes a peripheral LAN connection with the terminal 3007 (the "second second-tier base station," according to the Examiner). ***Mahany***, col. 44, lines 35-38. The Examiner appears to argue that the one skilled in the art can simply take the teachings of ***del Castillo*** (namely the teaching of sequentially coupling AMSs 12 to control an appliance 24) and apply them to ***Mahany*** to arrive at the claimed invention. The problem, however, is that there is no motivation to combine the references in the manner suggested by the Examiner. In fact, if anything, there is a suggestion that teaches away from such a combination. In ***Mahany***, devices such as the computer terminal 3007 and card reader 3009 are fitted with a small RF transceiver (see col. 44, lines 15-19) that communicate with each other using a peripheral LAN connection (see col. 44,

lines 36-38). As explained earlier, ***Mahany*** expressly teaches that these "peripheral LAN connections" are ephemeral by nature, and are terminated as a roaming device moves out of range of the other roaming device with which the connection is made. Indeed, ***Mahany*** explains that such a peripheral LAN connection is not a product of happenstance, but rather a design choice to take advantage of situations in which a spontaneous LAN may be more efficient way of communicating. ***Mahany,*** col. 9, lines 29-38. Thus, unlike the claimed invention, the purpose of the hierarchical structure in ***Mahany*** is not so that the host computer can control the card reader 3009, but rather to allow the computer terminal 3007 (*i.e.,* the second-tier base station, according to the Examiner) a greater degree of freedom to establish peripheral LAN connections with other peripheral devices (such as the reader 3009) on an as-needed basis. In fact, by introducing the notion of peripheral LANs, ***Mahany*** teaches away from the concept of host-based control because, according to the ***Mahany***, the roaming devices (including the terminal 3007) establish a peripheral LAN connection with other roaming devices on as-needed basis without the premise LAN and/or the host 3011 (see Figure 28A). The claimed invention, in contrast, calls for the host computer to control the remote device through the first-tier and second-tier base stations.

The Examiner argues that one skilled in the art would modify the system of ***Mahany*** as taught by ***del Castillo*** because "a host that controls a remote unit through a first-tier base station, a first second-tier base station, and a second second-tier base station is able to control remote appliances that are beyond the host's communications range while maintaining limited transmission power and distance to avoid governmental site licensing." Final Office Action, page 7. The problem with the Examiner's stated reason, however, is provides no reasonable basis for combining the teachings on ***del Castillo*** with that of ***Mahany***. In ***Mahany***, the concept

of "spontaneous" LANs is introduced to allow the roaming devices (*e.g.*, terminal 3007) a greater degree of flexibility to create peripheral networks with other roaming devices on an as-needed basis. As a consequence, these peripheral LANs are routinely terminated for various reasons, including if the roaming device (including the terminal 3007 or the so-called remote unit 3009) moves out of communication range. Thus, the Examiner's suggestion of extending the transmission range of the host by superimposing the sequential connection of AMSs 12 on top of the ***Mahany*** network architecture is fundamentally inconsistent with the teachings of ***Mahany*** for at least two reasons: first, the roaming terminal 3007 may not be in the communication range of the premises LAN (and hence the host) to allow the host to control any remote device; and second, and more notably, to the extent the roaming terminal's location is fixed relative to other peripheral devices (like that of the sequentially arranged AMSs 12 of ***del Castillo***), then it would undermine the freedom of the terminal 3007 to roam freely and create peripheral LANs with other devices on an as-need basis (i.e., it would defeat the very purpose of being able to establish spontaneous LANs). Accordingly, the Examiner's stated reason does not provide the requisite motivation to combine the applied references in the manner suggested. In fact, it provides a reason not to combine the references in the manner suggested by the Examiner. Consequently, the Examiner has failed to establish a *prima facie* case of obviousness. For at least this reason, claim 1 and other claims are allowable.

2. THERE IS NO REASONABLE EXPECTATION OF SUCCESS

As noted earlier, another requirement to establish a *prima facie* case of obviousness is reasonable expectation of success. Here, even assuming *arguendo* that the cited references were properly combinable (and they are not), the Examiner has nevertheless failed to establish that

such a combination would have a reasonable expectation of success. In fact, leading up to the appeal, the Examiner has not even once attempted to provide any basis for the reasonable expectation of success. Thus, for this additional reason, claim 1 and the other claims are allowable.

VIII. CONCLUSION

In view of the foregoing, it is respectfully submitted that the Examiner erred in not allowing all claims pending in the present application over the prior art of record. The undersigned Ruben S. Bains may be contacted at (713) 934-4064 with respect to any questions, comments, or suggestions relating to this appeal.

Respectfully submitted,

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APPENDIX A

34. (Previously Presented) A multi-tier system for digital radio communication, comprising:

a processor-based host adapted to control a remote unit;

a first-tier base station communicatively coupled to the host, wherein the first-tier base station operates in accordance with a first communications protocol;

a first second-tier base station communicatively coupled to the first-tier base station, wherein the first second-tier base station and the first-tier base station communicate using the first communications protocol; and

a second second-tier base station wirelessly coupled to the first second-tier base station, wherein the second second-tier base station is intermediate the first second-tier base station and the remote unit, and wherein the first second-tier base station is capable of communicating with the second second-tier base station without an intervening first-tier base station using a different communications protocol from the first communications protocol,

wherein the host is adapted to control the remote unit through the first-tier base station, the first second-tier base station, and the second second-tier base station.

35. (Previously presented) A multi-tier system for digital radio communication, comprising:

a processor-based host adapted to control a remote unit;

a first-tier base station communicatively coupled to the host;

a first second-tier base station communicatively coupled to the first-tier base station; and

a second second-tier base station wirelessly coupled to the first second-tier base station, wherein the second second-tier base station is intermediate the first second-tier base station and the remote unit, and wherein the first second-tier base station is capable of communicating with the second second-tier base station without an intervening first-tier base station,

wherein the host is adapted to control the remote unit through the first-tier base station, the first second-tier base station, and the second second-tier base station.

wherein the second second-tier base station is adapted to go into a sleep mode for a preselected interval, wherein before entering the sleep mode, the second second-tier base station transmits an indication representative of the duration of the preselected interval to the remote unit.

36. (Previously presented) The system of claim 35, wherein the duration of the preselected interval is defined by a start and end time of the preselected interval.

37. (Previously presented) The system of claim 34, wherein the second second-tier base station is adapted to:

buffer data intended for the remote unit;

transmit an indication at predetermined intervals to inform the remote unit of the presence of buffered data;

receive a request from the remote unit; and

provide the buffered data to the remote unit in response to receiving the request from the remote unit.

38. (Previously presented) The system of claim 34, wherein the remote unit comprises a data collection device.

39. (Previously presented) The system of claim 34, wherein the remote unit comprises a bar code reader or an RFID reader.

40. (Previously presented) The system of claim 34, wherein the remote unit comprises at least one of a vending machine, door locking mechanism, computer peripheral, thermostat, and pager.

41. (Previously presented) The system of claim 40, wherein the remote unit comprises a computer peripheral selected from the group comprising a printer, modem, handheld terminal, point of sale station, and other serial or parallel devices.

42. (Previously presented) The system of claim 34, wherein said first second-tier base station is wirelessly connected to the first-tier base station.

43. (Previously presented) The system of claim 34, wherein the first-tier base station is wirelessly connected to the local area network.

44. (Previously presented) The system of claim 34, wherein the first second-tier base station is connected to the first-tier base station through a serial port.

45. (Previously presented) The system of claim 34, further comprising a third second-tier base station intermediate the remote unit and the second second-tier base station, wherein the second second-tier base station communicates with the remote unit through the third second-tier base station.

46. (Previously presented) The system of claim 34, wherein the second second-tier base station communicates with the first-tier base station through the first second-tier base station.

47. (Previously Presented) A multi-tier system for digital radio communication, comprising:

a processor-based host adapted to control a remote unit through a control signal;

a first-tier base station adapted to receive the control signal from the host, wherein the first-tier base station operates in accordance with a first communications protocol;

a first second-tier base station adapted to receive the control signal from the first-tier base station, wherein the first second-tier base station and the first-tier base station communicate using the first communications protocol; and

a second second-tier base station wirelessly coupled the first second-tier base station, wherein the second second-tier base station is intermediate the first second-tier base station and the remote unit, and wherein the second second-tier base station is adapted to receive the control signal from the first second-tier base station using

a different communications protocol from the first communications protocol and to provide the control signal to the remote unit.

48. (Previously presented) The system of claim 47, further comprising a third second-tier base station intermediate the second second-tier base station and the remote unit, wherein the second second-tier base station provides the control signal to the third second-tier base station, which then provides the control signal to the remote unit.

49. (Previously presented) The system of claim 47, wherein the second second-tier base station is adapted to go into a sleep mode for a preselected interval, wherein before entering the sleep mode, the second second-tier base station transmits an indication representative of the duration of the preselected interval to the remote unit.

50. (Previously presented) The system of claim 49, wherein the duration of the preselected interval is defined by a start and end time of the preselected interval.

51. (Previously presented) The system of claim 48, wherein the first-tier base station is wirelessly coupled to the first second-tier base station, and wherein the first second-tier base station has a shorter transmission range relative to the first-tier base station.

52. (Previously presented) The system of claim 34, wherein the first-tier base station is wirelessly coupled to the first second-tier base station, and wherein the first second-tier base station has a shorter transmission range relative to the first-tier base station.

53. (Previously presented) The system of claim 34, wherein the second second-tier base station is adapted to:

transmit an associate command to the remote unit;

receive a message from the remote unit in response to the associate command, wherein the message comprises an identifier associated with the remote unit; and

transmit a synchronization interval to the remote unit in response to receiving the message.

54. (Previously presented) The system of claim 48, wherein the second second-tier base station is adapted to:

transmit an associate command to the remote unit;

receive a message from the remote unit in response to the associate command, wherein the message comprises an identifier associated with the remote unit; and

transmit a synchronization interval to the remote unit in response to receiving the message.

55. (Previously Presented) A multi-tier system for digital radio communication, comprising:

a processor-based host adapted to control a remote unit;

a first-tier base station communicatively coupled to the host, wherein the first-tier base station operates in accordance with a first communications protocol;

a first second-tier base station communicatively coupled to the first-tier base station, wherein the first second-tier base station and the first-tier base station communicate using the first communications protocol; and

a second second-tier base station wirelessly coupled to the first second-tier base station, wherein the second second-tier base station is intermediate the first second-tier base station and the remote unit, and wherein the second-tier base stations have a shorter transmission range relative to that of the first-tier base station,

wherein the host is adapted to control the remote unit through the first-tier base station, the first second-tier base station, and the second second-tier base station.

56. (Previously presented) The system of claim 55, wherein the second second-tier base station is adapted to go into a sleep mode for a preselected interval, wherein before entering the sleep mode, the second second-tier base station transmits an indication representative of the duration of the preselected interval to the remote unit.

57. (Previously presented) The system of claim 56, wherein the duration of the preselected interval is defined by a start and end time of the preselected interval.

58. (Previously presented) The system of claim 55, wherein the second second-tier base station is adapted to:

transmit an associate command to the remote unit;

receive a message from the remote unit in response to the associate command, wherein the message comprises an identifier associated with the remote unit; and

transmit a synchronization interval to the remote unit in response to receiving the message.